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cc: Tom

LISBON VALLEY MINING CO

Jeffery R. Smith
Field Manager
United States Department of Interior
Bureau of Land Management
Moab Field Office
82 East Dogwood
Moab, Utah 84532

July 10, 2012

Re: Response to USGS Information Request. Centennial Pit Backfilling Proposal. UTU-72499, Received June 14, 2012.

Dear Mr. Smith:

The Lisbon Valley Mining Company (LVMC) appreciates the opportunity to respond to the BLM's request for additional information regarding the above-referenced proposal.

LVMC is in the process of finalizing a report that specifically addresses the hydrogeologic and geochemical effects of partially backfilling the Centennial Pit. This work is being conducted independent of ongoing work provided by Whetstone Associates. We anticipate providing this report to the BLM in August 2012.

The current analysis is being performed with a numerical code (MODFLOW) to characterize the physical components of the pit lake water balance. The results correlate well with previous spreadsheet model developed in 1998 by Adrian Brown Consultants, Inc., and updated annually by Whetstone Associates. Geochemical analyses to estimate the quality of water in the pit lake are being conducted using PHREEQC. In addition to the modeling efforts, LVMC had performed a number of additional laboratory analyses on wall rock and various units of waste rock from the Centennial pit. From these data, an interpretation of pore water in the backfill material will be provided.

LVMC has prepared this response to each of the USGS comments. Comments are reiterated for reference.

Groundwater Model:

1. Results from the current model by Adrian Brown Consultants Inc. (1996) in the form of water budgets for each of the post-mining pit lakes are required to construct a coupled flow/geochemical model. The Sentinel Pit budget is presented in the modeling results document (p. 24) but only provides the post-mining pit lake area and the resulting groundwater infiltration to lower units. A complete budget analysis that provides the values for all the budget components (shown in the schematic on p. 21) is needed for all the post-mining pit lakes. The simulated water budget components for the pit lakes include: post-mining pit lake area and volume, groundwater infiltration to lower units, groundwater discharge to the pit lake, precipitation, evaporation, and surface run-off inputs.

Response to Ground Model comment #1.

It is important to clarify that the 1996 model is not the current BLM-approved model. This model does not represent the true hydrogeologic system. The current BLM-accepted model is provided in the 1998 Annual Update Report by Whetstone and subsequent updates. Included are complete budget analysis values for all pit lakes.

2. Modifying the model to simulate a backfilling scenario would only require modification to the material properties (specific storage, hydraulic conductivity) used for the mine pit voids to reflect the properties of unconsolidated backfill. This would be an additional simulation beyond current transient runs that would use the ending model outputs as starting heads equivalent to proposed backfilling commencement dates.

Response to Groundwater Model comment #2.

The current modeling effort includes steady state and transient calibration phases, in addition to a predictive phase for pit lake recovery. The backfill geometry is a partial backfill of a two-lobed open pit, one of which will be filled with waste rock. The difference in material properties between in-place rock and backfill has not been considered in the modeling effort, but will be addressed in the interpretations. If it appears that the backfill material properties represent a potentially sensitive set of parameters, an appropriate, additional simulation will be considered.

3. In addition to modification, particle tracking for water passing through backfilled pits would be useful in assessing the residence time of groundwater in backfilled material. This would also be useful in predicting travel times of water that will pass through backfilled materials

Response to Groundwater Model comment 3.

LVMC has rigorously assessed the leachability of the backfill in the laboratory by running meteoric water mobility tests (MWMT) on crushed samples of each type of waste rock expected to be included in the backfill. The testing procedures included multiple pore flushes to assess leaching of metals. Accordingly, the leaching potential of the backfill has been assessed through empirical, laboratory methods. To assess the impact of the backfill on pit lake chemistry, LVMC prefers this method over a modeling approach, but will consider particle tracking analysis as necessary.

Geochemistry:

1. The minimum detection limit for vanadium in the chemical analyses is 30 µg/L. This MDL is too high. An analytical method with a lower MDL (< 1 µg/L) should be used to analyze future samples for vanadium concentration. If possible, a lower MDL for dissolved iron should also be considered.

Response to Geochemistry Comment #1.

In recent years the method detection limit (MDL) for analysis of dissolved vanadium in groundwater samples has been 0.005 mg/L. For the recent meteoric water mobility tests (MWMT) on Centennial pit waste rock samples, the MDL used was also 0.005 mg/L. Previous MWMT tests did not include analysis of vanadium. Dissolved iron is above detection for most groundwater samples collected in the vicinity of the Centennial Pit. Recent MWMT tests have an MDL for iron of 0.02 mg/L.

2. Field parameters, including water temperature, dissolved oxygen, oxidation –reduction potential (ORP), specific conductance, and pH need to be collected using approved methods and with instruments that have been calibrated the day of sample collection. These parameters are critical for subsequent geochemical modeling. If the Lisbon Valley Mining is unfamiliar with the collection or equipment needed for the collection of the field parameters described above, technicians in the USGS Moab field office may be able to assist. We would time to coordinate with the USGS, but they have offered their services to help.

Response to Geochemistry Comment #2.

LVMC is experienced and equipped to measure all of the field parameters recommended and solicits the USGS participation as a quality assurance (QA) measure moving forward.

3. Based on the geochemical modeling results, it is likely that alkalinity was determined in the laboratory and not the field. Because of the importance of bicarbonate in forming complexes with uranium, it is important to obtain accurate alkalinity concentrations and the most accurate alkalinity values are determined from titrations immediately after sample collection. If the mine operator is not familiar with alkalinity titrations in a field setting, assistance can be obtained from USGS technicians in the Moab field office.

Response to Geochemistry Comment #3.

Alkalinity has been historically measured in an off-site laboratory in accordance with standard method 2320B, within the recommended hold time of 14 days. Additionally, groundwater sample results at Lisbon Valley typically display a low charge balance error (less than +/- 5%). LVMC is capable and amenable to conduct on-site field alkalinity titrations and once again solicits USGS participation as a QA measure moving forward.

4. No phosphorus data were included in the laboratory analysis of the Penny Pit Pool water sample. Since phosphorus species form important complexes and solid-phase precipitates with uranium, it is important to include both total phosphorus and orthophosphate in future analytical schedules.

Response to Geochemistry Comment #4.

LVMC will add total phosphorous and orthophosphate to the analyte list to further evaluate precipitation of uranium in pit lake waters.

5. Data needs for additional analysis of pit pool geochemistry include: (a) additional water and mineralogical analyses of existing pit pools that include the missing data identified in previous comments; (b) coupling of groundwater flow into pit pools with PHREEQC modeling to better understand reaction progress; (c) small-scale field experiments to better calibrate the PHREEQC evaporation model.

Response to Geochemistry Comment #5.

To date, the presence of water in the bottom of the Centennial Pit has been very limited. On rare occasions when water is present, it is typically from snowmelt or a recent storm event. There have been two samples collected and analyzed to date; the results of the first sample have been presented in Whetstone update reports. USGS has seen the chemistry results from the second sample, as referenced in your letter.

Arcadis is currently completing a quantitative assessment of groundwater inflows and post mining groundwater and pit lake water quality suing PHREEQC. Results will be provided in the pending report.

Field bench testing of evapoconcentration could be considered and LVMC would like to discuss this idea further with USGS to better understand what methods are available that could simulate long term evaporation of pit lake waters. The past and current modeling efforts have used local evaporation data for constraining this component of the water balance.

6. Results of Lisbon Valley's post mining groundwater chemistry assessment.

Response to Geochemistry Comment #6.

An evaluation of the post-mining groundwater quality is being completed as part of the current modeling effort; the results will be provided in a report next month.

LVMC appreciates the BLM/USGS partnership and ongoing support and look forward to a submission of a comprehensive report in July 2012.

Sincerely,

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cc Tom Munson DOGM